APPENDIX A: Best Management Practices (BMPs)

In addition to the guidelines in Appendix E (CNFISH), these BMPs expand and supplement the basic guidelines and minimum requirements of the BLM manual; the Idaho Department of Lands (Forest Practices Regulations); Idaho Department of Water Resources (IDWR) Stream Channel Alteration Regulations; and the Corps of Engineers 404 Regulations.

Road Planning, Design, and Location

- Plan road standards and specifications that maintain forest productivity, water quality, and fish and wildlife habitat.
- Road specifications and plans should be consistent with good safety practices. Plan each road to the minimum standards for the intended use. Adapt the plans to the soil materials and terrain, to minimize disturbance and damages to forest productivity, water quality, and wildlife habitat.
- Plan transportation networks to minimize road construction within riparian conservation areas. Leave or re-establish areas of vegetation between roads and streams.
- Plan roads no wider than necessary for safety and anticipated use. Minimize and balance cuts and fills, especially near streams. Fit the road to the natural terrain as closely as possible.
- Dispose of excavated waste material on geologically stable sites.
- While cut-and-fill road construction is common for gentle terrain, full-bench roads should be designed on slopes over 60 percent. End-haul excess material to a geologically stable site for disposal.
- Plan natural road cross-drainage by insloping or outsloping and by grade changes. Plan for effective, well-placed dips or water bars.
- Design relief culverts or roadside ditches where natural drainage will not protect the road surface, excavation, or embankment. Plan relief culvert locations to prevent fill erosion or direct discharge of sediment into streams.
- Plan minimum number of stream crossings. Make sure they comply with Stream Channel Alteration Law, Title 42; Chapter 38, Idaho Code. Be sure all Class I stream culvert installations allow fish passage.
- Consider reusing existing roads if new construction would result in more long-term impact to fish and wildlife.

Road construction

- Construct roads in a manner that prevents debris, overburden, and excess materials from entering streams. Deposit excess materials outside of stream protection zones.
- Construct roads to comply with Idaho Forest Practices Act (FPA) plan and design guidelines.
- Provide for quarry drainage, to prevent sediment from entering streams.

- Clear drainage ways of all debris, generated during construction or maintenance that may interfere with drainage or impact water quality.

- When constructing road fills near streams, compact the material to settle it, reduce erosion, and reduce water entry into fill. Minimize snow, ice, frozen soil, and woody debris buried in embankments.

- Construct road stream crossings or roads constricting upon a stream channel in compliance with the Stream Channel Alteration Law, Title 42, Chapter 38, Idaho Code.

- Stabilize slopes: Where exposed material (excavation, embankment, waste piles, etc.) is erodible and may enter streams, stabilize it before fall or spring runoff by seeding, compacting, riprapping benching, mulching, or other suitable means.

- Construct cross drains and relief culverts to prevent erosion. Use rip rap, woody debris, down spouts, or similar devices to prevent erosion of fills. Install drainage structures on uncompleted roads before fall or spring runoff.

- Install relief culverts with a minimum drain grade of 2 percent.

- Design roads to balance cuts and fills or use full bench construction where stable fill construction is not possible.

- Minimize sediment production from borrow pits and gravel sources through proper location, development and reclamation.

- Place debris, overburden, and other waste materials associated with construction and maintenance activities in a location to avoid entry into streams. Include these waste areas in soil stabilization planning for the road.

Road Drainage

- Provide adequate drainage from the surface of all permanent and temporary roads by using outsloped or crowned roads, drain dips, or insloped roads with ditches and crossdrains.

- Vary road grades to reduce concentrated flow in road drainage, ditches, culverts, and on fill slopes and road surfaces.

- Space road drainage features so peak drainage flow on the road surface or in ditches will not exceed the capacity of the individual drainage facilities.

- Outsloped Roads: Outsloped roads provide means of dispersing water in a low-energy flow from the road surface. Outsloped roads are appropriate when fill slopes are stable, drainage will not flow directly into stream channels, and transportation safety considerations can be met.

- Insloped Roads: For insloped roads, plan ditch gradients steep enough, generally greater than 2 percent, but less than 8 percent to prevent sediment deposition and ditch erosion. The higher gradients may be suitable for more stable soils; use the lower gradients for less stable soils.

- Drain Dips: Properly constructed drain dips can be an economical method of channeling surface flow off the road. Construct drain dips deep enough into the subgrade so that traffic will not obliterate them.

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- Prevent downslope movement of sediment by using sediment catch basins, drop inlets, changes in road grade, or recessed cut slopes.
- Where possible, install ditch relief culverts at the gradient of the original ground slope; otherwise armor outlets with rock or anchor downspouts to carry water safely across the fill slope.
- Skew ditch relief culverts 20 to 30 degrees toward the inflow from the ditch to improve inlet efficiency. Protect the upstream end of cross-drain culverts from plugging.
- Provide energy dissipators (rock piles, logs, etc.) where necessary at the downstream end of ditch relief culverts to reduce the erosion energy of the emerging water.
- Cross drains, culverts, water bars, dips, and other drainage structures should not be discharged onto erodible soils or fill slopes without outfall protection.
- Design roads for minimal disruption of drainage patterns
- Route road drainage through vegetation, slash windrows, or other sediment settling structures. Install road drainage features above stream crossings to route discharge into filtration zones before entering a stream.

Road Maintenance

- Maintain erosion control features through periodic inspection and maintenance, including cleaning dips and cross-drains, repairing ditches, marking culvert inlets to aid in location, and clearing debris from culverts.
- Avoid using roads during wet periods if such use would damage the road drainage features.
- Grade road surfaces only as often as necessary to maintain a stable running surface and to retain the original surface drainage.
- Avoid cutting the toe of cut slopes when grading roads or pulling ditches.
- Place all excess material removed by maintenance operations in safe disposal sites and stabilize these sites to prevent erosion. Avoid locations where erosion will carry materials into a stream.

Timber Harvesting Activities

- Stabilize or reclaim landings and temporary roads on completion of use.
- For each landing, skid trail, or fire trail, provide and maintain a drainage system to control the dispersal of water and to prevent sediment from entering streams.
- Install necessary cross-ditches on tractor skid trails. Appropriate spacing between cross-ditches is determined by the soil type and slope of the skid trails. Timely implementation is important.
- When natural re-vegetation is inadequate to prevent accelerated erosion before the next growing season, apply seed or construct cross-ditches on skid trails, landings, and fire trails. A light ground cover of slash or mulch will retard erosion.

Recommended Cross-ditch Spacing Distance for Roads and Skid Trails

Grade of Road or Trail	Unstable Soils (High Erosion Hazard)	Stable Soils (Low Erosion Hazard)
2	135'	170'
5	100'	140'
10	80'	115'
15	60'	90'
20	45'	60'
25+	30'	40'

Slash Treatment and Site Preparation:

- Use excavators equipped with rakes or crawler-tractors/rubber-tire skidders equipped with brush blades when piling slash. Avoid use of dozers with angle blades.
- Scarify the soil only to the extent necessary to meet the reforestation objective of the site. Site preparation equipment producing irregular surfaces is preferred. Care should be taken to preserve the surface soil horizon.
- Large woody debris may be left to slow surface runoff, return soil nutrients, provide shade for seedlings, and provide habitat for wildlife.
- Carry out brush piling and scarification when soils are frozen or dry enough to minimize compaction and displacement.
- Minimize or eliminate elongated exposure of soils up and down the slope during mechanical scarification. On steep slopes, carry out scarification in a manner that minimizes erosion.